U.S. Department of the Interior
U.S. Geological Survey

Scientific Investigations Map 3131
Sheet 2 of 2
Pamphlet accompanies map

LIST OF METAMORPHIC-TECTONIC ELEMENTS

York Terrane—Late Proterozoic (?) and Paleozoic sedimentary and metasedimentary rocks and minor Late Cretaceous tin-bearing granites; dominantly carbonate and siliciclastic lithologies, in which primary features are generally retained; fine-grained metasedimentary rocks are weakly foliated. Metamorphic and thermal history variable from unit to unit, and generally lower grade than Nome Complex. Tin granites intruded in shallow crustal settings. The generally brittle-shallow and steeply-dipping structures in the area may have formed in shallow contractional settings, extensional settings, or both

Nome Complex—Late Proterozoic and Paleozoic metasedimentary and metaigneous rocks, metamorphosed during the Mesozoic

Nome Complex, central—Penetratively deformed and recrystallized schists with ductile fabrics; mineral assemblages record a blueschist-facies event that traversed lawsonite-stable conditions and peaked at epidote-stable conditions; one eclogite-facies assemblage; blueschist-facies assemblages are variably overprinted by greenschist facies assemblages

Nome Complex, west-central—Weakly foliated metasedimentary and unfoliated metaigneous rocks that retain relict primary features; mineral assemblages in mafic rocks formed at pumpellyite-actinolite, greenschist, and blueschist facies (one locality)

Nome Complex, eastern—Penetratively deformed and recrystallized schists with ductile fabrics; protolith packages and metamorphic fabrics identical to Nome Complex in central Seward Peninsula; mineral assemblages in most of the area are characteristic of greenschist facies, but slightly higher grade assemblages occur in the vicinity of Kiwalik Mountain. Lack of high pressure metamorphic minerals may be significant or a product of poor exposure and limited sampling. Metamorphic history of this block may not be consistent throughout and the block may be cut by unrecognized faults

Nome Complex, northern—Weakly foliated metasedimentary and unfoliated metaigneous rocks; mineral assemblages in small metagabbro bodies are variable; some show weak greenschist-facies overprint, others show pervasive static overgrowth of greenschist-facies minerals over igneous minerals; one contains pseudomorphs after blue amphibole

High grade metamorphic and associated igneous rocks—Amphibolite and granulite-facies metamorphic rocks and associated Cretaceous plutons; penetratively deformed metasedimentary and metaigneous schist and gneiss with complex metamorphic histories; aluminum-rich lithologies show early development of kyanite-stable mineral assemblages succeeded by sillimanite-stable, lower-pressure assemblages. Lithologies rich in iron and aluminum retain early, relatively high pressure aluminosilicate plus orthoamphibole assemblages (>5kb) that are overprinted by relatively lower pressure cordierite plus staurolite or garnet assemblages (<5kb). Timing of peak metamorphism and exhumation may not be the same in Kigluaik, Bendeleben, and Darby mountain ranges. Kigluaik and Bendeleben ranges formed in the Tertiary and are bounded by active faults

Grantley Harbor fault zone—Weakly metamorphosed metasedimentary rocks with stronger deformational fabrics than those in the western Seward Peninsula, but weaker deformational fabrics than the Nome Complex. Primary sedimentary features locally preserved

Angayucham terrane—Mafic, ultramafic, and tonalitic rocks juxtaposed along a series of vertical faults with minor slivers of Nome Complex carbonate rocks; mafic rocks are volumetrically dominant, contain blueschist and albite-epidote-amphibolite facies metamorphic assemblages, and exhibit weakly foliated to mylonitic fabrics

Conglomerate and sandstone—Unmetamorphosed Cretaceous (?) carbonate-clast conglomerate and sandstone, likely related to marine sedimentary rocks of the Yukon-Koyukuk basin; Tertiary (?) sandstone and coal

Yukon-Koyukuk basin—Folded and faulted Mesozoic volcanic and marine sedimentary rocks and associated plutons.

Cenozoic volcanic rocks—Basalt cinder cones, flows, and large maar volcanoes with associated pyroclastic rocks

Kuguruk fault zone

METAMORPHIC MINERAL KEY

- **Lawsonite**
- **Pseudomorph after lawsonite**
- **Glaucophane**
- **Glaucophane and pseudomorph after lawsonite**
- **Pseudomorph after glaucophane**
- **Pseudomorph after glaucophane and pseudomorph after lawsonite**
- **Crossite or glaucophane**
- **Crossite or glaucophane and lawsonite**
- **Eclogite**
- **Aluminous rock with mineral assemblage that contains relicts of the reaction aluminosilicate + orthoamphibole = cordierite + garnet or staurolite (decrease in pressure)**
- **Aluminous rock with mineral assemblage that contains relicts of the reaction orthoamphibole + kyanite = cordierite + garnet or staurolite (decrease in pressure)**
- **Pelitic rock crystallized at temperatures above the second sillimanite isograd and aluminous rock with mineral assemblage that contains relicts of the reaction alumino-silicate + orthoamphibole = cordierite + garnet or staurolite (decrease in pressure)**
- **Pelitic rock crystallized at temperatures above the second sillimanite isograd**
- **Kyanite**
- **Andalusite**
- **Approximate position of second sillimanite isograd; teeth towards higher-grade rocks**

CONODONT COLOR ALTERATION INDEX (CAI) VALUES

[See appendix, including tables A-1 and A-2 in pamphlet, for more information]

- **Not determined**
- **1.5–2.5**
- **Minimum 1.5–2.5 and maximum 3.0–3.5**
- **3.0–3.5**
- **Minimum 1.5–2.5 and maximum 4.0–4.5**
- **Minimum 3.0–3.5 and maximum 4.0–4.5**
- **4.0–4.5**
- **5.0–5.5**
- **Minimum 5.0–5.5 and maximum 6.0–6.5**
- **6.0–6.5**
- **Minimum 5.0–5.5 and maximum 7.0–8.0**
- **Minimum 6.0–6.5 and maximum 7.0–8.0**
- **7.0–8.0**

MAP SYMBOLS

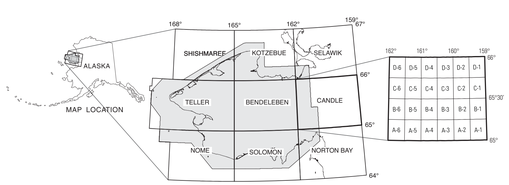
- **K-Ar, $^{40}Ar/^{39}Ar$, and Rb-Sr sample location; see table 2 for age data**
- **U-Pb zircon sample location; see table 3 for age data**
- **Mountain**
- **1:250,000-scale quadrangle boundary**
- **Contact**—Depositional, intrusive, or metamorphic, as shown on sheet 1
- **Fault**—Dotted where concealed, as shown on sheet 1
- **Contact**—Metamorphic-tectonic elements
- **Major fault or tectonic subdivision boundary**—Dashed where concealed or approximately located
- **Road**

Shaded relief from National Elevation Dataset (NED) 42.7-meter Digital Elevation Models (DEMs)
Universal Transverse Mercator Zone 3N; 1927 North American Datum
Base layer for water from 1:250,000 quadrangles (1950–1955)

SCALE 1:500 000

10 0 10 20 30 40 MILES
10 0 10 20 30 40 50 KILOMETERS

NATIONAL GEODETIC VERTICAL DATUM OF 1929



INDEX MAP SHOWING 1:250,000-SCALE QUADRANGLE NAMES AND LABELS FOR 1:63,360-SCALE QUADRANGLES WITHIN EACH 1:250,000-SCALE QUADRANGLE

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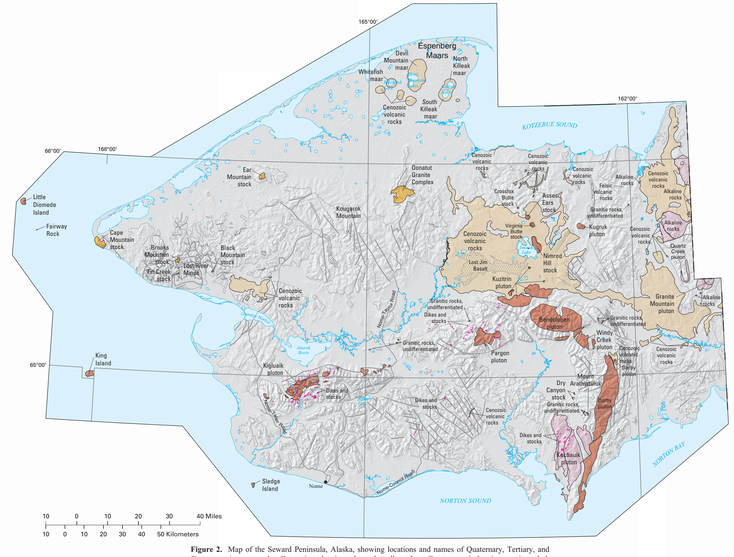

Figure 2. Map of the Seward Peninsula, Alaska, showing locations and names of Quaternary, Tertiary, and Cretaceous igneous rocks. Cenozoic volcanic rocks, pale yellow; Late Cretaceous tin-bearing granites, dark yellow; compositionally diverse Early and Late Cretaceous rocks, brownish red; Early Cretaceous alkalic rocks, pale pink; dikes and stocks, magenta.

Tectonic, Metamorphic, and Geographic Data for the Seward Peninsula, Alaska

By

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